CLAIMS

1. An improved process for the production and purification of vinyl aromatic monomers which comprises:

a) feeding a stream consisting of an aromatic hydrocarbon together with a stream essentially consisting of a C_2-C_3 olefin, to an alkylation section;

b) feeding the reaction product coming from the alkylation section to a first separation section;

c) discharging from the first separation section, a first stream consisting of non-reacted aromatic hydrocarbon which is recycled to the alkylation section, a second stream essentially consisting of a mono-alkylated aromatic hydrocarbon, a third stream essentially consisting of dialkylated aromatic hydrocarbons, sent to a transalkylation section, and a fourth stream essentially consisting of a mixture of polyalkylated aromatic hydrocarbons;

d) feeding the second stream of step (c) to a dehydrogenation section;

e) feeding the reaction product coming from the dehydrogenation section to a second purification/separation section, comprising at least one distillation column;

f) feeding the fourth stream of step (c) to said at least one distillation column;

g) discharging from the head of said at least one distil-

lation column, a stream consisting of the vinyl aromatic monomer having a purity higher than 99.7% by weight.

2. The process according to claim 1, wherein the aromatic hydrocarbon fed to the alkylation section consists of benzene, refinery grade, whereas the olefinic stream consists of ethylene or propylene, refinery grade.

3. The process according to claim 2, wherein the olefinic stream consists of ethylene.

4. The process according to claim 1, 2 or 3, wherein the aromatic and olefinic streams are fed to the alkylation unit so as to have aromatic/olefin molar ratios ranging from 2 to 50.

5. The process according to any of the previous claims, wherein the alkylation reaction takes place in the presence of catalysts selected from aluminum trichloride, synthetic and natural porous crystalline solids based on silicon and aluminum in which the silicon/aluminum atomic ratio ranges from 5/1 to 200/1 and synthetic zeolites of the ZSM group in which the silicon/aluminum atomic ratio ranges from 20/1 to 200/1.

6. The process according to any of the previous claims, wherein the alkylation reaction is carried out at a temperature ranging from 50 to 450°C.

7. The process according to claim 3, wherein the catalyst

consists of aluminum trichloride and the temperature ranges from 100 to 200°C.

8. The process according to any of the previous claims, wherein the alkylation reaction is carried out at a pressure ranging from 0.3 to 6 MPa.

9. The process according to any of the previous claims, wherein the aromatic stream leaving the alkylation reactor is fed to a separation system consisting of a series of at least three distillation columns for the recovery of at least the mono-alkyl substituted aromatic compound, to be sent to the dehydrogenation unit, and a heavy bottom product essentially consisting of polyalkylated products, tetralines and alkyl substituted diphenyl ethanes.

10. The process according to any of the previous claims, wherein the catalytic dehydrogenation reaction takes place in a fixed bed reactor, at a temperature ranging from 500 to 700°C, at a pressure ranging from 0.02 to 0.15 MPa, in the presence of a catalyst based on iron oxide and potassium carbonate.

11. The process according to any of the previous claims, wherein the second purification/separation section comprises three or four distillation columns connected in series with respect to the flow of monomer to be purified.

12. The process according to any of the previous claims, wherein the bottom stream leaving the separation section of

alkylated products is sent to any of the distillation columns, at any height thereof and, optionally, by premixing said heavy bottom product with any of the streams present in said second purification/separation section.

13. The process according to claim 12, wherein the bottom stream leaving the separation section of alkylated products is sent in the feeding to the first distillation column of the second purification/separation section.